

The documentation and process conversion measures necessary to comply with this revision shall be completed by 12 November 1997

INCH-POUND

MIL-PRF-19500/385B
12 August 1997
SUPERSEDING
MIL-S-19500/385A
24 April 1985

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, FIELD-EFFECT TRANSISTOR, N-CHANNEL, SILICON
TYPES 2N4856 THROUGH 2N4861, JAN, JANTX JANTXV, AND JANS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for N-channel, depletion-mode, silicon J-FET transistors. Four levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (TO-18).

1.3 Maximum ratings.

P_T 1/ $T_A = 25^\circ\text{C}$	P_T 2/ $T_C = 25^\circ\text{C}$	V_{DS}, V_{DG}		V_{GS}		I_G	T_J and T_{STG}
		2N4856 2N4857 2N4858	2N4859 2N4860 2N4861	2N4856 2N4857 2N4858	2N4859 2N4860 2N4861		
W	W	V_{dc}	V_{dc}	V_{dc}	V_{dc}	mA_{dc}	$^\circ\text{C}$
0.36	1.8	40	30	-40	-30	50	-65 to +200

1/ Derate linearly 2.06 mW/ $^\circ\text{C}$ for $T_A > +25^\circ\text{C}$.

2/ Derate linearly 10.3 mW/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAT, 3990 East Broad Street, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A
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FSC 5961

1.4 Primary electrical characteristics. $T_C = +25^\circ\text{C}$, unless otherwise specified.

	$I_{DSS} \text{ 1/}$ $V_{DS} = 15 \text{ V dc}$ $V_{GS} = 0$			$V_{DS(\text{on})}$			$V_{GS(\text{off})}$ $V_{DS} = 15 \text{ V dc}$ $I_D = 0.5 \text{ nA dc}$		
				$V_{GS} = 0$ $I_D = 20 \text{ mA dc}$	$V_{GS} = 0$ $I_D = 10 \text{ mA dc}$	$V_{GS} = 0$ $I_D = 5 \text{ mA dc}$			
	2N4856 2N4859	2N4857 2N4860	2N4858 2N4861	2N4856 2N4859	2N4857 2N4860	2N4858 2N4861	2N4856 2N4859	2N4857 2N4860	2N4858 2N4861
	<u>mA dc</u>	<u>mA dc</u>	<u>mA dc</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>
Min	50	20	8				-4	-2	-0.8
Max	175	100	80	0.75	0.50	0.50	-10	-6	-4

Min Max	$r_{ds(on)}$			$R_{\theta JA}$	$R_{\theta JC}$
	$V_{GS} = 0; I_D = 1.0 \text{ mA dc}$ $I_D = 100 \mu A \text{ ac(rms)}$ $f = 1 \text{ kHz}$				
	2N4856 2N4859	2N4857 2N4860	2N4858 2N4861		
	Ω	Ω	Ω		
	$\frac{^{\circ}C}{mW}$	$\frac{^{\circ}C}{mW}$	$\frac{^{\circ}C}{mW}$		
	25	40	60	0.486	0.097

1/ Pulsed (see 4.5.1).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

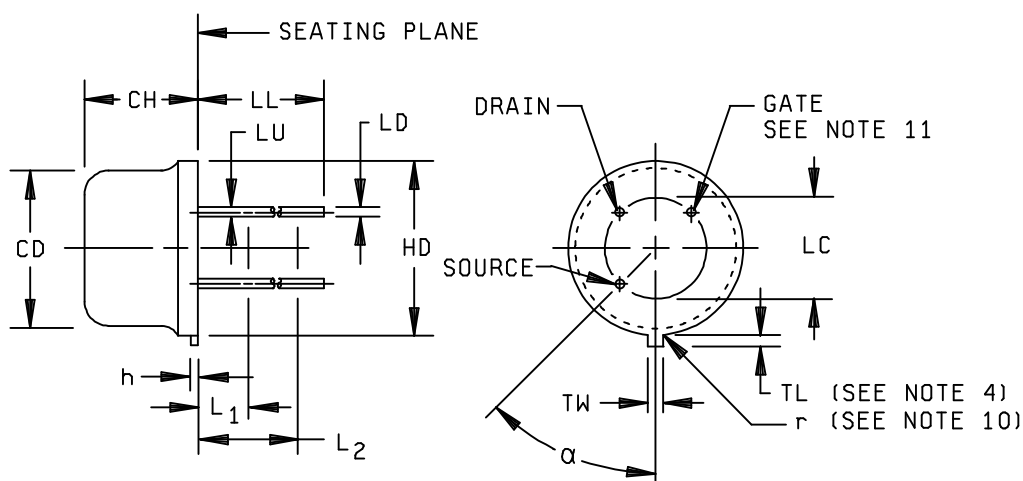
MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARD

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

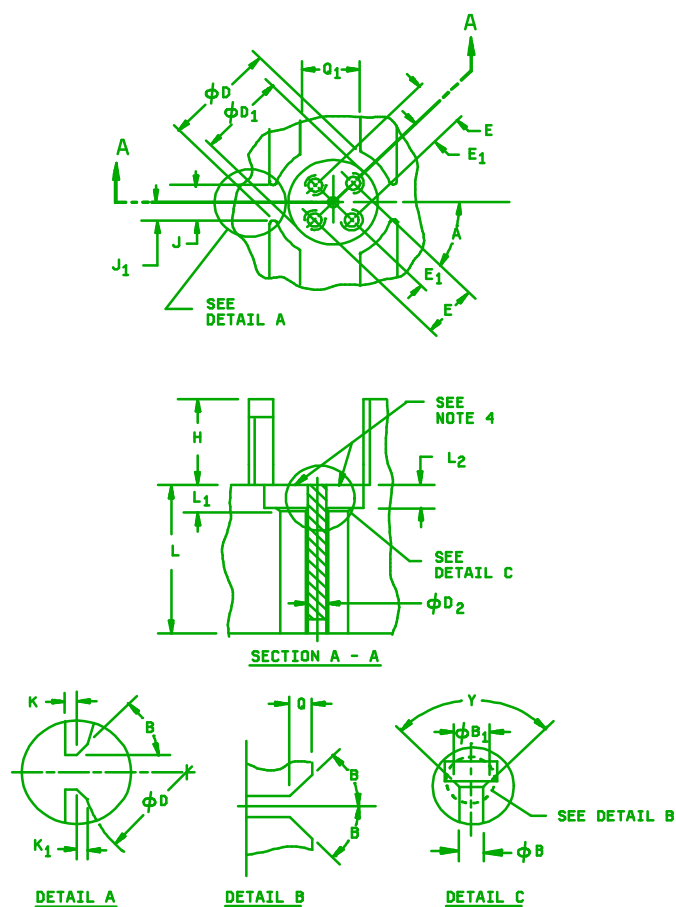


Ltr	Dimensions				Notes	Ltr	Dimensions				Notes
	Inches		Millimeters				Inches		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
CD	.178	.195	4.52	4.95		LU	.016	.019	0.41	0.48	8, 9
CH	.170	.210	4.32	5.33		L ₁	---	.050	---	1.27	5, 8, 9
h	---	.020	---	0.508		L ₂	.250	---	6.35	---	8, 9
HD	.209	.230	5.31	5.84		r	---	.010	---	0.25	10
LC	.100 TP		2.54 TP		7	TL	.028	.048	0.71	1.22	4
LD	.016	.021	0.41	0.53	8, 9	TW	.036	.046	0.91	1.17	3
LL	.500	.750	12.70	19.05	8, 9	α	45 TP		45 TP		7

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Beyond radius (r) maximum, TW shall be held for a minimum length of .011 inch (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Outline in this zone is not controlled.
6. Dimension CD shall not vary more than .010 inch (0.25 mm). This zone is controlled for automatic handling.
7. Leads at gauge plane .054 +.001, -.000 inch (1.37 +0.03, -.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods or by the gauge and gauging procedure shown on figure 2.
8. LU applies between L₁ and L₂. LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
9. All three leads.
10. Radius (r) applies to both inside corners of tab.
11. The gate shall be internally connected to the case.

FIGURE 1. Physical dimensions.



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The location of the tab locator within the limits indicated will be determined by the tab and flange dimensions of the device being checked.
4. Gauging procedure. The device being measured shall be inserted until its seating plane is $.125 \pm .010$ inch (3.18 ± 0.25 mm) from the seating surface of the gauge. A force of 8 ounces ± 0.5 inch (13 mm) shall then be applied parallel and symmetrical to the device's cylindrical axis. The seating plane of the device shall be seated against the gauge. The use of a pin straightener prior to insertion in the gauge is permissible.
5. Four holes.
6. Pressed in.

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A	44.90°	45.10°	44.90°	45.10°	
B	45.10° Nom		45.10° Nom		
φB	.0325	.0335	0.826	0.851	5
φB ₁	.043 Nom		1.09 Nom		5
φD	.2310	.2315	5.867	5.880	
φD ₁	.159	.181	4.04	4.09	
φD ₂	.040 Nom		1.02 Nom		
E	.0995	.1005	2.527	2.553	
E ₁	.0495	.0505	1.257	1.283	
H	.145	.155	3.88	3.94	
J	.0470	.0475	1.194	1.207	
J ₁	.0235	.0245	0.597	0.622	
K	.009	.011	0.23	0.28	
K ₁	.005 Nom		0.127 Nom		
L	.372	.378	9.45	9.60	
L ₁	.054	.055	1.37	1.40	
L ₂	.043 Nom		1.09 Nom		
Q	.040 Nom		1.02 Nom		
Q ₁	.123	.127	3.12	3.23	
Y	90° Nom		90° Nom		

FIGURE 2. Gauge for lead and tab locations.

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications or specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Devices furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2 Associated specification. The individual item performance requirements shall be in accordance with MIL-PRF-19500, and as specified herein.

3.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

3.4 Interface requirements and physical dimensions. The interface requirements and physical dimensions shall be as specified in MIL-PRF-19500 and on figure 1 herein.

3.4.1 Lead finish. Unless otherwise specified, lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein.

3.4.2 Construction. These devices shall be constructed in a manner and using materials which enable the transistors to meet the applicable requirements of MIL-PRF-19500 and this document.

3.4 Marking. Devices shall be marked as specified in MIL-PRF-19500.

3.5 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.6 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3)
- c. Conformance inspection (see 4.4).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500.

4.3 Screening (JANS, JANTX and JANTXV levels). Screening shall be in accordance with MIL-PRF-19500 (Appendix E, table IV), and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see appendix E, table IV of MIL-PRF-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
9	$I_{D(off)1}$ and $r_{ds(on)}$; I_{GSS1} ; I_{DSS}	Not applicable.
10	Not applicable	Not applicable
11	$\Delta I_{GSS1} = \pm 0.1$ nA or ± 100 percent of initial value, whichever is greater, $\Delta r_{ds(on)} = \pm 20$ percent; $\Delta I_{DSS} = \pm 15$ percent $\Delta I_{D(off)1} = 0.1$ nA or ± 100 percent of initial value.	$I_{D(off)1}$ and $r_{ds(on)}$; I_{GSS1} , I_{DSS}
12	See 4.3.1	See 4.3.1
13	Subgroups 2 and 3 of table I herein: $\Delta I_{DSS} = \pm 15$ percent, $\Delta r_{ds(on)} = \pm 20$ percent $\Delta I_{D(off)1} = 0.1$ nA or ± 100 percent of initial value; $\Delta I_{GSS1} = \pm 0.1$ nA or ± 100 percent of initial value, whichever is greater.	Subgroup 2 of table I herein; $\Delta r_{ds(on)} = \pm 20$ percent; $\Delta I_{GSS1} = \pm 0.1$ nA or ± 100 percent of initial value, whichever is greater, $\Delta I_{D(off)1} = 0.1$ nA or ± 100 percent of initial value; $\Delta I_{DSS} = \pm 15$ percent

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows:

$T_A \geq 150^\circ\text{C}$; 2N4856, 2N4857, 2N4858 = $V_{GS} = 80$ percent of rated V_{GS} , $V_{DS} = 0$

2N4859, 2N4860, 2N4861 = $V_{GS} = 80$ percent of rated V_{GS} ; $V_{DS} = 0$

NOTE: No heat sink or forced air cooling on the devices shall be permitted.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with appendix E, table V of MIL-PRF-19500, and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table VIa (JANS) and table VIb (JANTX and JANTXV) of MIL-PRF-19500, and as follows. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table II herein.

4.4.2.1 Group B inspection, appendix E, table VIa (JANS) of MIL-PRF-19500.

Subgroup	Method	Conditions
B4	1037	$P_T = 360$ mW at $T_A = 30^\circ\text{C} \pm 5^\circ\text{C}$; 2,000 cycles.
B5	1027	96 hours; $V_{DS} = 15$ V dc; $I_D = 24$ mA at $T_A = 100^\circ\text{C}$; or adjust as required by the chosen T_A to give an average lot $T_J = 275^\circ\text{C}$.
B6	3151	$T_1 = 25^\circ\text{C}$, $T_2 = 125^\circ\text{C}$, $R_{\theta JA} \leq 486^\circ\text{C/W}$.

4.4.2.2 Group B inspection, appendix E, table VIb (JANTX and JANTXV) of MIL-PRF-19500.

Subgroup	Method	Conditions
B3	1027	2N4856, 2N4857, 2N4858 = $V_{GS} = -32$ V dc, 2N4859, 2N4860, 2N4861 = $V_{GS} = -24$ V dc; at $T_A = 175^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $V_{DS} = 0$ V.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table VII of MIL-PRF-19500. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table II herein.

4.4.3.1 Group C inspection, appendix E, table VII of MIL-PRF-19500.

Subgroup	Method	Conditions
C6	1027	2N4856, 2N4857, 2N4858 = $V_{GS} = -32$ V dc, 2N4859, 2N4860, 2N4861 = $V_{GS} = -24$ V dc; at $T_A = 175^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $V_{DS} = 0$ V.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical examination	2071					
<u>Subgroup 2</u>						
Breakdown voltage, gate to source	3401	Bias condition C; $V_{DS} = 0$ V dc; $I_G = 1.0$ μ A dc	$V_{(BR)GSS}$	-40 -30		V dc V dc
2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861						
Gate reverse current	3411	Bias condition C; $V_{DS} = 0$ $V_{GS} = -20$ V dc $V_{GS} = -15$ V dc	I_{GSS1}		-0.25 -0.25	nA dc nA dc
2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861					0.25	nA dc
Drain current	3413	Bias condition C; $V_{DS} = 15$ V dc $V_{GS} = -10$ V dc	$I_{D(off)1}$			
Drain current	3413	$V_{DS} = 15$ V dc; $V_{GS} = 0$, (pulsed, see 4..5.1) bias condition C	I_{DSS}			
2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861				50 20 8	175 100 80	mA dc mA dc mA dc
Drain to source "on" state voltage	3405	Bias condition B; $V_{GS} = 0$ $I_D = 20$ mA dc $I_D = 10$ mA dc $I_D = 5$ mA dc	$V_{DS(on)}$		0.75 0.50 0.50	V dc V dc V dc
2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861						
Gate to source "off" state voltage	3403	$V_{DS} = 15$ V dc; $I_D = 0.5$ nA dc	$V_{GS(on)}$	-4 -2 -0.8	-10 -6 -4	V dc V dc V dc
2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861						
<u>Subgroup 2 Continued</u>						
Static drain to source "on" state resistance	3421	$V_{GS} = 0$; $I_D = 1.0$ mA dc	$r_{ds(on)}$		25 40 60	Ω Ω Ω
2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861						

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 3</u> High temperature operation: Gate reverse current 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861 Drain current	3411	$T_A = +150^\circ\text{C}$	I_{GSS2}			
		Bias condition C; $V_{DS} = 0\text{ V dc}$ $V_{GS} = -20\text{ V dc}$ $V_{GS} = -15\text{ V dc}$			-0.5 -0.5	$\mu\text{A dc}$ $\mu\text{A dc}$
	3413	$V_{DS} = 15\text{ V dc}$; Bias condition A $V_{GS} = -10\text{ V dc}$	$I_{D(OFF)2}$		0.5	$\mu\text{A dc}$
<u>Subgroup 4</u> Small-signal, common-source short-circuit, input capacitance Small-signal, common-source, reverse transfer capacitance Turn-on delay time 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861 Rise time 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861 Turn-off delay time 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861 <u>Subgroups 5, 6, and 7</u> Not applicable	3431	$V_{DS} = 0$; $V_{GS} = -10\text{ V}$; $f = 1\text{ MHz}$; $C_1 = .1\mu\text{F}$, $C_2 = 20.1\text{m}$ $FL_1 = L_2 \geq 500\mu\text{H}$	C_{ISS}		18	pF
		$V_{DS} = 0\text{ V dc}$; $V_{GS} = -10\text{ V}$ $f = 1\text{ MHz}$; $C_1 = .1\mu\text{F}$, $L_1 = L_2 \geq 500\mu\text{H}$			8	pF
	3433	See figure 3	$t_{d(on)}$		6 6 10	ns ns ns
	3433	See figure 3	t_r		3 4 10	ns ns ns
	3433	See figure 3	$t_{d(off)}$		25 50 100	ns ns ns
	3433	See figure 3	$t_{d(off)}$		25 50 100	ns ns ns

1/ For sampling plan, see MIL-PRF-19500.

TABLE II. Groups A, B, C, and E electrical end-point measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Gate current 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861	3411	Bias condition C $V_{GS} = -20$ V dc $V_{GS} = -15$ V dc	I_{GSS1}		-0.25 -0.25	nA dc nA dc
2.	Drain current 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	3413	Bias conditions C; $V_{GS} = 0$; $V_{DS} = 15$ V dc; pulsed, see 4.5.1	I_{DSS1}	50 20 8	175 100 80	mA dc mA dc mA dc
3.	Breakdown voltage, drain to source 2N4856, 2N4857, 2N4858 2N4859, 2N4860, 2N4861	3401	Bias condition C; $V_{DS} = 0$; $I_G = -1.0$ μ A dc	$V_{BR(GSS)}$	-40 -30		V dc V dc
4.	Static drain to source "on"-state resistance 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	3421	$V_{GS} = 0$; $I_D = 1.0$ mA dc	$r_{DS(on)}$		25 49 60	Ω Ω Ω
5.	Drain current	3413	Bias condition A; $V_{DS} = 15$ V dc $V_{GS} = -10$ V dc	$I_{D(OFF)1}$		0.25	nA dc
6.	Drain current	3413	Bias condition A; $V_{DS} = 15$ V dc $V_{GS} = -10$ V dc	$I_{D(off)1}$		1.0	nA dc
7.	Drain current	3413	Bias condition A; $V_{DS} = 15$ V dc $V_{GS} = -10$ V dc	$I_{D(off)1}$		2.5	nA dc
8.	Static drain to source "on"-state resistance 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	3421	$V_{GS} = 0$ V dc; $I_D = 1.0$ mA dc	$r_{DS(on)}$		30 48 72	Ω Ω Ω

See footnotes at end of table.

TABLE II. Groups A, B, C, and E electrical end-point measurements - Continued. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
9.	Drain to source "on" state voltage 2N4856, 2N4859 2N4857, 2N4860 2N4858, 2N4861	3405	Bias condition B $I_D = 20 \text{ mA dc}$ $I_D = 10 \text{ mA dc}$ $I_D = 5 \text{ mA dc}$		$\pm 50 \text{ mV}$ from previous measured value 4/		
10.	Static drain to source "on"-state resistance	3421	$V_{GS} = 0$; $I_{DS} = -1.0 \mu\text{A dc}$	$\Delta r_{DS(on)}$	± 25 percent change from initial recorded value 4/		
11.	Drain current	3413	Bias condition C; $V_{DS} = 15 \text{ V dc}$; $V_{GS} = 0$ pulsed (see 4.5.1)	ΔI_{DSS1}	± 15 percent initial value 4/		

1/ The electrical measurements for appendix E, table VIa (JANS) of MIL-PRF-19500 are as follows:

- a. Subgroup 3, see table II herein, steps 1, 2, 3, 4, and 5.
- b. Subgroup 4, see table II herein, steps 1, 2, 3, 4, 5, and 9.
- c. Subgroup 5, see table II herein, steps 1, 2, 3, 4, 5, 10, and 11.

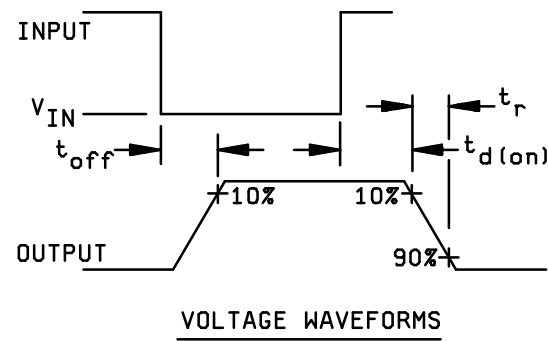
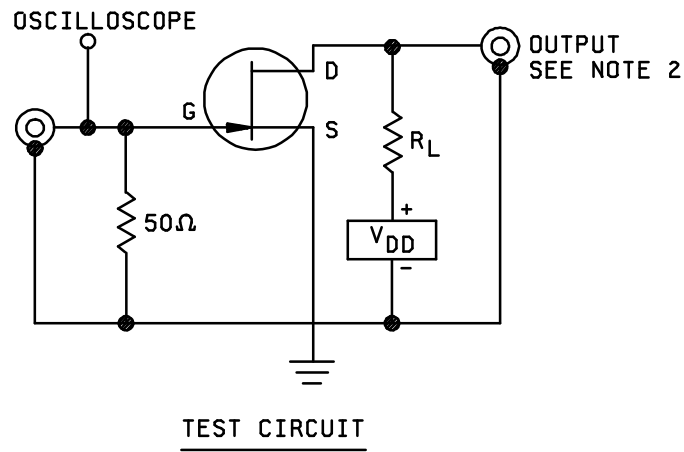
2/ The electrical measurements for appendix E, table VIb (JANTX and JANTXV) of MIL-PRF-19500 are as follows:

- a. Subgroup 2, see table II herein, steps 4 and 6.
- b. Subgroup 3, see table II herein, steps 7 and 8.
- c. Subgroup 6, see table II herein, steps 7 and 8.

3/ The electrical measurements for appendix E, table VII of MIL-PRF-19500 are as follows:

- a. Subgroup 2, see table II herein, steps 1, 2, 3, 4, and 5 (JANS); and steps 4 and 6 (JANTX and JANTXV).
- b. Subgroup 3, see table II herein, steps 1, 2, 3, 4, and 5 (JANS); and steps 7 and 8 (JANTX and JANTXV).
- c. Subgroup 6, see table II herein, steps 1, 2, 3, 4, 5, 10, and 11 (JANS); and steps 7 and 8 (JANTX and JANTXV).

4/ Devices which exceed the group A limits for this test shall be rejected.



Test conditions and component value						
Type	V _{DD}	V _{GS(on)}	V _{GS(off)}	R _L	V _{IN}	I _{D(on)} 1/
	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>Ω</u>	<u>V dc</u>	<u>mA dc</u>
2N4856, 2N4859	10	0	-10	464	-10	20
2N4857, 2N4860	10	0	-6	953	-6	10
2N4858, 2N4861	10	0	-4	1,910	-4	5

1/ Nominal value; exact value varies slightly with transistor parameters.

NOTES:

- The input waveform has the following characteristics:
 $t_p = 200 \text{ ns}$; $t_r \leq 1 \text{ ns}$; duty cycle ≈ 2 percent. It is supplied by a generator with $Z_{out} = 50 \text{ ohms}$.
- Waveforms are monitored on an oscilloscope with the following characteristics:
 $t_r \leq .1 \text{ ns}$; $R_{IN} \geq 1 \text{ M ohm}$; 2.5 mA ; $C_{IN} \leq 2.5 \text{ pF}$.

FIGURE 3. Switching time test circuit and waveforms.

5. PACKAGING

5.1 Packaging. Packaging shall prevent mechanical damage of the devices during shipping and handling and shall not be detrimental to the device. When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2 Marking. Unless otherwise specified (see 6.2), marking shall be in accordance with MIL-STD-129.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. See MIL-PRF-19500.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No.19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from , Defense Supply Center Columbus, ATTN: DSCC-VQE, 3990 East Broad Street, Columbus, OH 43216-5000.

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Army - CR
Navy - EC
Air Force - 17

Preparing activity:
DLA - CC
(Project 5961-1478)

Review activities:
Air Force - 85, 99

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL**INSTRUCTIONS**

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2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-19500/385B

2. DOCUMENT DATE (YYMMDD)
970812

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, FIELD-EFFECT TRANSISTOR, N-CHANNEL, SILICON, TYPES 2N4856 THROUGH 2N4861 JANTX, JANTXV, AND JANS

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION**6. SUBMITTER**

a. NAME (Last, First, Middle initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

7. DATE SUBMITTED
(YYMMDD)

(1) Commercial

(2) AUTOVON
(If applicable)

8. PREPARING ACTIVITY

a. NAME Alan Barone

b. TELEPHONE (Include Area Code)

(1) Commercial (2) AUTOVON
(614)692-0510 850-0510

c. ADDRESS (Include Zip Code) , Defense Supply Center Columbus, ATTN: DSCC-VAT, 3990 East Broad Street, Columbus, OH 43216-5000

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:

Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466
Telephone (703) 756-2340 AUTOVON 289-2340